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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/620,968

07/15/2003

Mark A. Smith

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12/15/2005

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EXAMINER

ZARNEKE, DAVID A

ART UNIT

PAPER NUMBER

2891

DATE MAILED: 12/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/620,968

Applicant(s)

SMITH ET AL.

Examiner

David A. Zameke

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-25,48,50-52 and 54-57 is/are pending in the application.
- 4a) Of the above claim(s) 14-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-13, 48, 50-52, 54-57 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3-7, 54 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tilmans et al., US Patent 6,297,072, in view of Tyler et al., US Patent 5,399,805.

Tilmans (figure 4 & 12-15) teaches a MEMS package, comprising: a substrate [2] with a MEMS structure (structures within cavity in Figures 12-15) fabricated on a surface of the substrate; a cover plate [1] bonded to the surface of the substrate by a bond ring [3]; an inner cavity defined by the substrate, the cover plate and the bond ring; and a fill port [4] defined by the substrate, the cover plate and a breach in the bond ring.

Tilmans fails to teach a volume of liquid sealed within the inner cavity.

Tyler teaches filling the inner cavity with a compliant polymer, such as a viscous liquid or gel (4, 50+ & 5, 1+).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the liquid of Tyler in the invention of Tilmans to fill the inner cavity because Tyler teaches the use of air to fill the cavity causes delamination. This delamination is prevented by using a liquid (1, 32+).

With respect to claim 3, Tilmans teaches a seal disposed in the fill port (5, 42+).

As to claim 4, Tilmans teaches the bond ring comprises at least one of a glass frit, adhesive, eutectic solder, solder mask material, anodic bond, covalent bond, laser weld or Sol-gel material (4, 41+).

In re claim 5, Tilmans teaches the seal comprises at least one of an adhesive, organic adhesive, epoxy, solder or glass-based sealant (5, 42+).

As to claim 6, while Tilmans only teaches the reflowing of solder to create the seal, it would have been obvious to one of ordinary skill in the art to use a curable adhesive as the seal or as both the bond ring and the seal because curable adhesives and solder are conventionally known equivalents that are notoriously well known to the skilled artisan to be useable in the sealing of two substrates to form a cavity therebetween. The substitution of one known equivalent technique for another may be obvious even if the prior art does not expressly suggest the substitution (Ex parte Novak 16 USPQ 2d 2041 (BPAI 1989); In re Mostovych 144 USPQ 38 (CCPA 1964); In re Leshin 125 USPQ 416 (CCPA 1960); Graver Tank & Manufacturing Co. V. Linde Air Products Co. 85 USPQ 328 (USSC 1950). See Rice, US Patent 6,624,003 [sealing ring (8, 424+) made of UV curable adhesive (9, 20+) or solder (9, 8+)] or Lin et al., US Patent 6,953,985 [seal ring (320) made of adhesive or solder (22, 51+)].

Regarding claim 7, Tilmans teaches bond pads (output pads) for making electrical connections to the MEMS package arranged in an exposed portion of the substrate (figure 16).

With respect to claim 54, Tilmans teaches the bond ring comprises at least one of a glass frit, adhesive, eutectic solder (4, 41+ & 5, 3+), anodic bond, covalent bond, laser weld or Sol-gel material.

As to claim 55, Tyler teaches the seal comprises at least one of an adhesive, organic adhesive, epoxy (5, 1+), or glass-based sealant.

Claims 8-13, 56 and 57 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Tilmans, et al., US Patent 6,297,072, in view of Tyler et al., US Patent 5,399,805.

Tilmans (figure 4 & 12-15) teaches a MEMS package adapted for use in a range of operating temperatures comprising:

- a substrate [2] with MEMS circuitry (figures 12-15) fabricated on a surface of the substrate;

- a cover plate [1] bonded to the surface of the substrate by a bond ring [3];

- a fill port [4] defined by the substrate, the cover plate and a breach in the bond ring;

- an inner cavity defined by the substrate, the cover plate and the bond ring; and

- fluid sealed within the inner cavity, the fluid having a coefficient of thermal expansion, wherein the inner cavity has a volume which is small enough so that expansion of the fluid throughout the range of operating temperatures is accommodated by deflections of at least the cover plate, substrate and bond ring (5, 36+).

Tilmans fails to teach a volume of liquid sealed within the inner cavity.

Tyler teaches filling the inner cavity with a compliant polymer, such as a viscous liquid or gel (4, 50+ & 5, 1+).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the liquid of Tyler in the invention of Tilmans to fill the inner cavity because Tyler teaches the use of air to fill the cavity causes delamination. This delamination is prevented by using a liquid (1, 32+).

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Regarding claim 9, Tilmans teaches a seal disposed in the fill port (5, 42+).

With respect to claim 10, Tilmans teaches the bond ring comprises at least one of a glass frit, adhesive, eutectic solder, solder mask material, anodic bond, covalent bond, laser weld or Sol-gel material (4, 41+).

As to claim 11, Tilmans teaches the seal comprises at least one of an adhesive, organic adhesive, epoxy, solder or glass-based sealant (5, 42+).

Regarding claim 12, while Tilmans only teaches the reflowing of solder to create the seal, it would have been obvious to one of ordinary skill in the art to use a curable adhesive as the seal or as both the bond ring and the seal because curable adhesives and solder are conventionally known equivalents that are notoriously well known to the skilled artisan to be useable in the sealing of two substrates to form a cavity therebetween. The substitution of one known equivalent technique for another may be obvious even if the prior art does not expressly suggest the substitution (*Ex parte Novak* 16 USPQ 2d 2041 (BPAI 1989); *In re Mostovych* 144 USPQ 38 (CCPA 1964); *In re Leshin* 125 USPQ 416 (CCPA 1960); *Graver Tank & Manufacturing Co. V. Linde Air Products Co.* 85 USPQ 328 (USSC 1950). See *Rice*, US Patent 6,624,003 [sealing ring (8, 424+) made of UV curable adhesive (9, 20+) or solder (9, 8+)] or *Lin et al.*, US Patent 6,953,985 [seal ring (320) made of adhesive or solder (22, 51+)].

In re claim 13, Tilmans teaches bond pads (output pads) for making electrical connections to the MEMS package arranged in an exposed portion of the substrate (figure 16).

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With respect to claim 56, Tilmans teaches the bond ring comprises at least one of a glass frit, adhesive, eutectic solder (4, 41+ & 5, 3+), anodic bond, covalent bond, laser weld or Sol-gel material.

As to claim 57, Tyler teaches the seal comprises at least one of an adhesive, organic adhesive, epoxy (5, 1+), or glass-based sealant.

Claims 48, 50-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tilmans, et al., US Patent 6,297,072, in view of Tyler et al., US Patent 5,399,805.

Tilmans teaches a MEMS device, comprising:

a substrate [2] with a MEMS structure (figures 12-15) fabricated on a surface of the substrate;

a cover plate [1] bonded to the surface of the substrate by a bond ring [3];

an inner cavity defined by the substrate, the cover plate and the bond ring; and

a fill port [4] defined by the substrate, the cover plate and a breach in the bond ring.

While Tilmans fails to specifically teach a spatial light modulator wherein the substrate has a MEMS mirror array fabricated thereon, Tilmans does teach the formation of MEMS devices such as micromirrors, for example (1, 19+), therefore making it obvious to one of ordinary skill in the art to use the micromirrors to form a spatial light modulator. The use of conventional materials to perform their known functions in a conventional product is obvious (MPEP 2144.07).

Tilmans fails to teach a volume of liquid sealed within the inner cavity.

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Tyler teaches filling the inner cavity with a compliant polymer, such as a viscous liquid or gel (4, 50+ & 5, 1+).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the liquid of Tyler in the invention of Tilmans to fill the inner cavity because Tyler teaches the use of air to fill the cavity causes delamination. This delamination is prevented by using a liquid (1, 32+).

With respect to claim 50, Tilmans teaches a seal disposed in the fill port (5, 42+).

As to claim 51, Tilmans teaches the bond ring comprises at least one of a glass frit, adhesive, eutectic solder, solder mask material, anodic bond, covalent bond, laser weld or Sol-gel material (4, 41+).

In re claim 52, Tilmans teaches the seal comprises at least one of an adhesive, organic adhesive, epoxy, solder or glass-based sealant (5, 42+).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art cited but not relied upon teaches the state of the art.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

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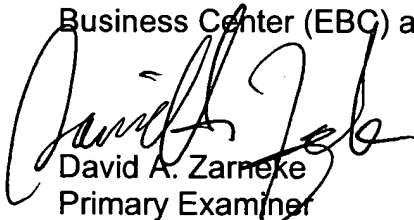
TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Zarneke whose telephone number is (571)-272-1937. The examiner can normally be reached on M-Th 7:30 AM-6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Baumeister can be reached on (571)-272-1722. The fax phone number for the organization where this application is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).



David A. Zarneke
Primary Examiner
December 10, 2005